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## MEDICAL NEWS LETTER

Vol. 42

Friday, 19 July 1963

No. 2

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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

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The issuance of this publication approved by the Secretary of the Navy on 28 June 1961.



Ileoproctostomy in Ulcerative Colitis

Ward O. Griffen Jr \*, Richard C. Lillehei \*, and Owen H. Wangensteen \*, Minneapolis, Minn. Ileoproctostomy in ulcerative colitis: long-term follow-up, extending in early cases to more than 20 years, Surgery 53: 705-710, June 1963.

Must the rectum be sacrificed in all cases of chronic ulcerative colitis treated surgically? This question has become an issue in the operative treatment of the disease. The enthusiasm for less direct procedures such as ileostomy, appendicostomy, and vagotomy has waned. Most authorities have emphasized that the colon should be removed, but whether or not sphincter function should be preserved has stimulated much controversy.

In 1901, a report of total colectomy and ileosigmoidostomy in a case of "hyperplastic colitis" demonstrated the feasibility of the procedure. In 1943, a one-stage ileoproctostomy was advocated as a satisfactory method of removing the major portion of the diseased bowel for ulcerative colitis while preserving the anal sphincters. The first such operation was performed in this clinic in 1940, and the patient has been well since. The second patient, operated upon in April 1942, caused quite a stir among members of the staff. It was evident that residual disease would be left when the ileum was attached to the midrectum. The proctologists based their opposition to the proposal on the thesis that the remaining disease in the rectum would migrate into the ileum. The patient, however, was more inclined to go along with the advice that excision of 90 to 95% of the diseased colon should afford an opportunity to overcome the illness.

The proposed operation was performed, with the ileum anastomosed to the rectum. Soon, the need for transfusions, which had been a prominent feature of the preoperative course, was eliminated. Eight months later, definite improvement in the remaining rectum was noted on proctoscopic examination. This patient with a typical diffuse erosive hemorrhagic ulcerative colitis has remained well for more than 20 years following a resection which left residual disease in the remaining rectal segment.

In 1948, a report was made from this clinic on 13 patients with ulcerative colitis treated by subtotal colectomy and reconstitution of the intestinal tract by an ileorectal anastomosis. At the same time, Devine and Devine also reported on a series of 11 extremely ill patients treated by a multistage ileorectal anastomotic procedure with hopeful results. Because of the promise held by vagotomy, an operation for the management of ulcerative colitis then advocated in this clinic by Dennis, primary resection was surrendered in favor of the simpler procedure. Meanwhile, the tendency of patients with longstanding ulcerative colitis to develop aggressive carcinoma of the colon and rectum had been emphasized by Lynn and others. This argument served to lend increased enthusiasm for total colectomy and proctectomy. Thus it was that the

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\* From the Department of Surgery, University of Minnesota Medical School.

one-stage primary total colectomy pioneered in this clinic for some patients with ulcerative colitis fell by the way for a period of years.

More recently, Aylett of London and Schneider of St. Louis reawakened interest in subtotal colic resection for ulcerative colitis, performing the operation in stages by choice. They emphasized the greater happiness of patients when it was possible to treat the disease and preserve the rectal sphincters. Meanwhile, a number of reports have been made on the subject of ileoproctostomy in the treatment of chronic ulcerative colitis. Some have supported the operation while others have rejected its use. Several authors who have admitted the feasibility of the procedure have expressed an attitude of caution: careful selection of patients, vigorous preoperative treatment of rectal disease if present, and multiple staging are emphasized.

This report concerns the long-term follow-up of patients previously presented in 1948, with the addition of patients operated upon in more recent years. Several points regarding the status of the rectal disease at the time of operation, amount of ileum resected, level of anastomosis, and necessity for a continuing follow-up have been evaluated.

All 53 of the patients reported in this study had chronic ulcerative colitis diagnosed by history and verified by X-ray studies, proctosigmoidoscopic examinations, and gross and histologic examination of the excised surgical specimen. A few patients had only segmental involvement of the colon. A long history of bloody diarrhea with remissions and exacerbations was usual; 26 patients had undergone previous operative treatment directed at the illness. Upon admission to this clinic, all were subjected to a complete and systematic study. Those believed to be suitable candidates for operation were prepared by adequate diet, blood transfusions when needed, and other supportive measures.

At operation, total colectomy was performed. In a majority of cases, a closed anastomosis was made; in a few instances, open anastomosis was used by some surgeons. Restoration of intestinal continuity was accomplished by primary ileoproctostomy (46 patients), cecoproctostomy (one patient), and ileal pull-through (5 patients). In one patient only, a left hemicolectomy was performed because the disease was segmental in nature. A diverting ileostomy was made at the time of colorectal resection in only one patient. This group of patients has been followed in this clinic since operation.

In this report, results are given of the operation performed on 28 females and 25 males with an average age of 36.7 years. The youngest patient was 9 years of age and the oldest, 64. Additional operations reported here were performed between 1948 and 1961, allowing for a maximum follow-up of 23 years in the one patient operated upon in 1940.

It is evident that selected cases of chronic ulcerative colitis can be treated by total colectomy with ileoproctostomy. Although some patients do well even though the residual rectum shows evidences of involvement, there are risks in effecting an ileorectal anastomosis under these conditions. The experience of the authors is similar to that of Aylett, who regularly observes remission of rectal disease in patients treated by ileoproctostomy. There is little mention in the literature of the amount of ileum excised in reported cases. However, this factor obviously plays an important role in the eventual



outcome of these patients, as it does in those who have undergone total colectomy for primary cancer of the colon. Unless the ileum exhibits evidence of involvement with chronic ulcerative colitis, there is no need to excise more than a centimeter or two in making the anastomosis.

The level of anastomosis is extremely important, as pointed out by Aylett. He maintains that, frequently, the disease is least in the rectal ampulla and greatest at the rectosigmoid level, and he, therefore, urges that the anastomosis be made as low as possible. This concept is borne out in the present series in which most of the patients in the good result group have an anastomosis at less than 10 cm from the anus. In the 3 patients in this group who have an anastomosis at more than 20 cm from the anus, preoperative examination showed a normal bowel to 26 cm.

In the present series, a diverting ileostomy proximal to the anastomosis was made only once. The mortality rate of 3.9% was not out of line with the experience of those who favor a routine complementary diverting ileostomy. Moreover, the observed morbidity in this series, without a diverting ileostomy, was not essentially greater than that experienced by those favoring the more conservative mode of surgical management.

It must be stressed that patients with chronic ulcerative colitis treated by ileoproctostomy be kept under constant surveillance. Two patients in this series developed carcinoma in the remaining rectum, a complication which has been observed by others. Neither of these patients had reported to the outpatient clinic regularly. Moreover, it has been pointed out that rectal carcinoma developing in the course of ulcerative colitis can occur during a quiescent period when the patient is asymptomatic and the bowel mucosa has no evidence of colitis. Therefore, regular proctoscopy must be performed regardless of the patient's symptoms. Inability to maintain adequate follow-up has invited failure of the procedure.

An advantage stressed by Aylett is that ileoproctostomy does afford the patient a chance to lead a relatively normal life in many instances. If it fails, further operation can be performed. Colectomy and proctectomy with permanent ileostomy as the initial surgical endeavor against this disease represent a policy from which there is no return.

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#### Scalene-Lymph-Node Biopsy \* Reappraisal of Risks and Indications

David B. Skinner MD\*\*, Boston. The New England J Med 268(24):  
1324-1329, June 13, 1963.

Should scalene-lymph-node biopsy be performed routinely in patients suspected of having lung cancer? What are the risks of the operation and the expected yield of positive results in various clinical syndromes? Reports of series of biopsies provide little information to assist the physician in deciding when a biopsy is indicated. This is a report of 5 years' experience with scalene

lymph-node biopsy at the Massachusetts General Hospital undertaken to assess the clinical value and risk, and to determine specific indications for this procedure.

The term "scalene-lymph-node biopsy" was introduced by Daniels in 1949. Since then the procedure has been used extensively. However, results presented in numerous series have been variable. Bansmer, Lawrence, and Hill surveyed the literature before 1959 and found that biopsies in patients with lung cancer ranged from 9 to 54% positive. Results of series reported since 1959 continued to show wide divergence. There has also been disagreement about indications for scalene-lymph-node biopsy. Some have recommended its use routinely in any patient with bronchogenic carcinoma, or with any undiagnosed pulmonary infiltrate. Others have urged that biopsy be reserved for specific clinical situations. Results presented in this report support the latter point of view and stress the potential risk of the biopsy that has not previously been emphasized in the literature.

It is surprising that complications from scalene-lymph-node biopsy have not been described more frequently. The dissection is performed in a region adjacent to major vessels, lymphatic trunks, nerves, and pleura. Anatomic relations may be distorted by anomalies, tumor, or inflammation. The operative field may be obscured by hemorrhage from large veins of the transverse cervical vessels. Infections that occur may rapidly spread through opened fascial planes into the mediastinum. Hence, mishaps should be anticipated. Lymph fistulas, air embolism, and Horner's syndrome are reported. However, injuries to nerves—which occurred in this series—have rarely been described. No deaths have previously been reported. If serious complications occur in patients with extensive thoracic disease, occasional deaths must be expected. Some of the deaths in this series might have been avoided if scalene-lymph-node biopsy had been considered a potentially hazardous procedure rather than a routine biopsy. That no ill-effects resulted from biopsy of supraclavicular lymph nodes as compared to the 11.8% overall incidence of morbidity and mortality from that of scalene lymph nodes emphasizes the difference between these two procedures. The hazards of the latter must be recognized, and patients should be carefully selected for the operation.

Scalene-lymph-node biopsy is indicated whenever the anticipated yield of information exceeds the expected risk. The results of this study suggest clinical situations in which a high yield of positive biopsies will be obtained. As expected, patients with palpable nodes often provided positive results. Several surgeons reported that palpable nodes lay in the scalene fat pad instead of the supraclavicular region. Patients with lung cancer and hilar lesions or adenocarcinomas frequently had positive nodes. Joseph and Woods, and Shields and Shockett also reported more frequent positive biopsies in patients with hilar lesions. Reports by Umider, Skinner et al, and Connar have indicated that adenocarcinoma and undifferentiated carcinoma more frequently metastasized to scalene lymph nodes than squamous-cell carcinoma.

When scalene-lymph-node biopsy was performed on patients with potentially curable lung cancer without palpable nodes to select inoperable cases



before operation, only 6% had positive biopsies. This figure matches the over-all rate of major complications and deaths directly caused by biopsies of scalene lymph nodes. Furthermore, several complications and one death occurred in this specific group of patients. Shields and co-workers also reported 7.5% and 6.3% positive results in two series describing similarly selected patients. Morgan and Scott reported 11% positive results in 108 cases of bronchogenic carcinoma. The majority of these cases were in potentially curable patients without palpable nodes. These authors stressed the fact that scalene-lymph-node biopsy is not a reliable test for predicting inoperability. Methods are available, including bronchoscopy, azygos venography, and venous angiocardiology, that more accurately assess mediastinal invasion. If bronchoscopy or sputum cytologic studies do not provide a tissue diagnosis in obviously incurable patients, scalene-lymph-node biopsy does offer a method of establishing the diagnosis and avoiding thoracotomy. In 30 such cases in this series, 6 of 9 patients with, and 3 of 21 without palpable nodes (14%) had positive results. These 9 patients were spared thoracotomy for diagnostic purposes only.

On the basis of these considerations, indications for scalene-lymph-node biopsy can be suggested. Biopsy will be worthwhile in the following types of patients with suspected bronchogenic carcinoma: those with palpable nodes in whom a tissue diagnosis cannot be obtained without thoracotomy; in incurable patients in whom a tissue diagnosis cannot be obtained without thoracotomy; and in those who are poor risks for thoracotomy and whose tumors seem of borderline curability, especially if located near the hilus. Biopsy does not seem warranted in potentially curable patients without palpable nodes. The few patients in this group who prove incurable are often benefited by palliative resections. Patients with inoperable lesions in whom a tissue diagnosis can be obtained by other means should not be subjected to biopsy.

In patients with carcinoma arising outside the lung, scalene-lymph-node biopsy has limited value. Pualwan et al and da Silva Neto and co-workers have reported biopsies in patients with intra-abdominal cancer. They recommend its use in patients with stomach or pancreatic carcinoma. This study indicates that scalene-lymph-node biopsy is not indicated in cases of intra-abdominal cancer unless pulmonary metastases have occurred or nodes are palpable. If lung metastases are present, and a diagnosis cannot be made without exploration, biopsy may be worthwhile regardless of the presence or absence of palpable nodes.

The value of the procedure in non-neoplastic diseases seems limited to sarcoidosis and occasional cases of tuberculosis. Many authors have stressed its usefulness in suspected cases of sarcoidosis. Biopsy is quite worthwhile in the absence of palpable nodes. Wilson, Laforet, and Strieder have discussed the role of scalene-lymph-node biopsy in patients with tuberculosis. This study also verifies the usefulness of biopsy in cases in which tuberculosis is difficult to establish or differentiate from other pulmonary

diseases. Except to exclude sarcoidosis, tuberculosis, or neoplasm, scalene-lymph-node biopsy is not indicated in patients with pulmonary infections or infiltrates, suspected "group" diseases, or difficult diagnostic problems.

When indications for biopsy are clear, the surgeon should make a determined effort to obtain a positive specimen. Supraclavicular-lymph-node biopsy alone is adequate only if positive nodes are removed. If doubt exists, a frozen-section examination should be performed. If the biopsy is negative, scalene-lymph-node dissection should be done. If positive nodes are not obtained by scalene-lymph-node biopsy, dissection into the mediastinum may be considered. This has been advocated by Harken and associates, Connar, and Lui et al, but was used only rarely in the present series. Harken and his co-workers reported that the yield of positive biopsies in patients without palpable nodes was doubled if the operation was extended into the mediastinum. If specific indications for the procedure are applied to patients able to tolerate the dissection and its possible complications, scalene-lymph-node biopsy will remain a valuable adjunct to the management of intrathoracic disease.

One hundred and eighty-six biopsies of scalene and 64 biopsies of supraclavicular lymph nodes performed at the Massachusetts General Hospital between 1957 and 1961 are reviewed. This study defines a limited but valuable role for scalene-lymph-node biopsy in the management of intrathoracic diseases.

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\* From the Surgical Service, Massachusetts General Hospital, and the Department of Surgery, Harvard Medical School.

\*\* Assistant resident in surgery, Massachusetts General Hospital.

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#### Intracellular Hydrogen Ion Changes and Potassium Movement

E. B. Brown Jr\*, and Gernard Goott\*\*, Dept of Physiology, University of Minnesota, Minneapolis, Minn. Amer J Physiol 204:765-770, May 1963.

Intracellular hydrogen ion concentration was determined on skeletal muscle by the DMO technic in dogs subjected to various acid-base alterations. The data verified the fact that a given alteration in  $P_{CO_2}$  produces a larger hydrogen ion change in intracellular fluid than in extracellular fluid. In spite of this, however, the ratio  $\frac{(H^+)i}{(H^+)e}$  decreased. On the basis of this change in ratio, the

Donnan equilibrium would predict that potassium would move from intracellular to extracellular compartment and not in the reverse direction as had been assumed previously. Using the change in plasma potassium as the criterion of direction of movement of potassium between intracellular and extracellular fluids, the movement of potassium produced by any of the acid-base alterations which were studied was usually that which would be predicted by the Donnan equilibrium.

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\* Present address: Dept of Physiology, Kansas University Medical Center, Kansas City, Kan. \*\*Investigation carried out during tenure of a National Heart Institute postdoctoral Fellowship.



### Fluothane - A Clinical Evaluation of 1000 Cases

By Captain J. G. Kurfees MC USN.\* From the Proceedings of Monthly Staff Conferences of the U. S. Naval Hospital, NNMC, Bethesda, Md., 1961 - 1962.

In recent years, a particular need has become apparent for a nonflammable and nonexplosive anesthetic agent which is potent, easily reversible, and safe. While searching for such a compound, Suckling in England synthesized a fluorinated ethane derivative trifluoromonobromemonochlorethane called halothane (fluothane). The first clinical work with fluothane was reported by Johnstone in 1956. It was made available to the American market in April 1958. During the past 5 years, fluothane has been subjected to intensive clinical and pharmacologic investigations and is now generally recognized to be a useful anesthetic agent for most surgical operations.

Fluothane first became available to the Anesthesiology Department at the U. S. Naval Hospital in January 1959. After reviewing the clinical reports on the use of this anesthetic, representing over twenty thousand administrations, and observing its use at a large Medical Center, it was decided to give the drug a trial.

From January 1, 1959 to May 1, 1961, fluothane was used as the principal anesthetic agent in 1000 administrations to patients of all ages from 4 weeks to 85 years (Table I) and in almost every type of surgical procedure (Table II). There were very few poor risk patients in the group and the length of operations varied from 10 minutes to over 6 hours. There were no deaths under anesthesia, but two cardiac arrests occurred. Both of these were rapidly reversed with open cardiac massage in one patient and closed cardiac massage in the other.

### METHODS OF ADMINISTRATION

Fluothane has been administered by the following methods: Open drop, closed circle, semiclosed circle and nonbreathing. All these technics used without accurate, precise means of vaporizing this drug have proven to be hazardous. ~~Fluothane should be used only in vaporizers that have been calibrated accurately~~ to permit concentrations that can be altered in fractions of 0.1% over a clinical range of 0.5%. There are several such vaporizers available on the market today.

In the author's series of cases, fluothane was administered, using an efficient vaporizer. In infants and children, a nonbreathing technic with a flow of four liters of oxygen or two liters of nitrous oxide and two liters of oxygen was utilized during induction and maintenance of anesthesia. In adults, a semi-closed circle absorption technic with a flow of four liters of oxygen or

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TABLE I

AGE DISTRIBUTION		
	No. Cases	%
Less than 1	19	1.9
1 - 4	48	4.8
5 - 14	156	15.6
15 - 29	239	23.9
30 - 44	332	33.2
45 - 59	134	13.4
60 - 74	59	5.9
Over 75	13	1.3
	<u>1000</u>	<u>100.0%</u>

TABLE II

TYPE OF SURGERY		
	No. Cases	% Total
Upper Abdominal	69	6.9
Lower Abdominal	103	10.3
Intrathoracic	21	2.1
Body Wall	113	11.3
Back and Extremities	305	30.5
E.E.N.T.	76	7.6
Other Head and Neck	134	13.4
Rectal, Vaginal, Perineal	149	14.9
Cysto. and T.U.R.	30	3.0
	<u>1000</u>	<u>100.0%</u>

TABLE III

ANESTHETIC COMBINATIONS USED		
	No. Cases	% Total
Fluothane - O <sub>2</sub>	22	2.2
Fluothane - O <sub>2</sub> - Relaxant	7	0.7
Fluothane - O <sub>2</sub> - Barbiturate - Relaxant	1	0.1
Fluothane - O <sub>2</sub> - N <sub>2</sub> O	182	18.2
Fluothane - O <sub>2</sub> - N <sub>2</sub> O - Barbiturate	275	27.5
Fluothane - O <sub>2</sub> - N <sub>2</sub> O - Relaxant	21	2.1
Fluothane - O <sub>2</sub> - N <sub>2</sub> O - Barbiturate - Relaxant	492	49.2
	<u>1000</u>	<u>100.0%</u>



two liters of nitrous oxide and two liters of oxygen was used during both induction and maintenance. To obviate any excitement stage and shorten the induction, a sleep dose of sodium pentothal (200-300 mg) was administered preceding application of the face mask.

Premedication. Premedication consisted of a barbiturate given 2 hours prior to surgery and morphine or demerol with atropine, one hour before surgery.

Induction. Induction of anesthesia was smooth, rapid, and free from coughing, straining, salivation, or laryngospasm. Pharyngeal and laryngeal reflexes were obtunded quickly. The surgical anesthetic stage was attained in 10 to 15 minutes.

Maintenance. Smooth levels of anesthesia were maintained in the great majority of patients with concentrations of 0.5 to 1.5%. Muscular relaxation was usually not satisfactory for abdominal surgery with fluothane alone, and for upper abdominal procedures, a slow drip of succinylcholine 0.2% was utilized. d-Tubocurarine chloride was not administered in this series because of the pronounced hypotension which has been reported following injection.

Emergence. Emergence from anesthesia was, in the vast majority of cases, very rapid. In those cases where anesthesia had been maintained with a concentration of 1% or less, return to consciousness usually occurred within a period of 10 minutes. In those cases which necessitated fluothane concentrations of 2% for maintenance, emergence was somewhat delayed, requiring 15 to 30 minutes.

Nausea and vomiting in the postoperative period were uncommon. The author's impression was that nausea and vomiting were markedly reduced with this agent as compared to ether and cyclopropane.

Shivering was noted occasionally as the patient was emerging from the anesthetic. No obvious explanation for this was apparent, although it is believed that the presence of peripheral vasodilatation during anesthesia with associated heat loss could reduce body temperature and account for shivering postoperatively.

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Cardiovascular Effects. Hypotension and bradycardia were frequently observed during induction with fluothane when high concentrations were administered and also after anesthesia was induced with sodium pentothal followed immediately by the usual induction concentration of 2% fluothane. It was soon noted that, in patients in whom anesthesia was induced with pentothal and the introduction of fluothane was withheld until the patient recovered from the initial fall of blood pressure caused by the barbiturate, there was very little subsequent fall in blood pressure, provided the fluothane was introduced slowly by using a 0.5 to 1.0% concentration. Also, patients induced with nitrous oxide-oxygen mixtures using a 2% concentration of fluothane had very little fall in blood pressure. The

degree of hypotension appeared to be proportional to the concentration of anesthetic agent and, upon withdrawal of the agent, the blood pressure returned quickly to normal levels. If, as in a few cases, hypotension was accompanied by bradycardia, it could often be corrected by intravenous atropine. Also of interest, it was observed that during hypotensive episodes the patients were warm and dry, and had dilated veins and full pulses. When hypotension was marked and could not be controlled by lightening the level of anesthesia, intravenous injection of small doses of vasopressor agents proved to be very effective.

The incidence of pulse abnormalities, other than bradycardia, was noted to be no greater than with any other commonly used inhalation anesthetic agent.

Respiratory Effects. Fluothane is a potent respiratory depressant and in the author's series of cases respirations were either assisted or controlled most of the time. In light surgical planes of anesthesia, intercostal paresis was first seen and this was followed by intercostal paralysis. In deeper planes of anesthesia, there were depression and cessation of diaphragmatic activity. Rate of respiration was not usually altered, although in some patients a tachypnea from 30 to 40 respirations per minute was seen. Frequently, surgical stimulation was associated with rapid respirations.

### CONCLUSIONS AND SUMMARY

As a result of the author's experience with fluothane in one thousand patients undergoing all types of surgery, fluothane has come to be regarded as a very satisfactory anesthetic agent when administered with vaporizers which permit accurate control of the vapor concentrations.

The writer was impressed with the following advantages:

- Nonirritability of respiratory tract
- Decrease in salivary and bronchial secretions
- Rapid smooth induction
- Ease of maintenance
- Rapid reversibility of action by controlling the vapor concentration
- Rapid recovery time without excitement
- Reduction in nausea and vomiting

Disadvantages noted in study were:

- Respiratory and circulatory depression
- Moderate relaxation only
- Bradycardia
- High cost of agent and necessity for using special vaporizers
- Incompatibility with epinephrine
- Slow onset of analgesia

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## SUBMARINE MEDICINE SECTION



**OPPORTUNITY !** Some spaces still available for the course of Instruction in Submarine Medicine in the class convening in October 1963. Address your request via your CO to the Chief, Bureau of Medicine and Surgery, Navy Department, Washington 25, D. C.

After training in Submarine Medicine you would be engaged in the newest and most interesting part of the Navy. This expanding and challenging field offers many advantages. Briefly, among these are:

**POLARIS!** (Fleet Ballistic Missile) - the Navy's highest priority program

**CREDITABLE SERVICE** - Training and experience gained in Submarine Medicine creditable toward Certification in Internal Medicine and by the American Board of Preventive Medicine in the sub-specialty of Occupational Medicine.

**OBLIGATED SERVICE** - Only requirement to agree to serve in Submarine Medicine Program for two years following completion of training. This obligation runs concurrently with any other obligation that you may have.

**CLINICAL MEDICAL SPECIALTY TRAINING** - Available to Submarine Medical Officers on equal basis with other medical officers but background has, on occasion, enhanced possible selection.

**ADDITIONAL COMPENSATION** - Diving pay for diving duty; submarine pay commensurate with rank and time in service.

**VARIED BILLETS** afford opportunities for those interested in teaching and research; submarine, diving, and underwater demolition operations; as well as staff assignments, viz., duty as medical officer on SS(N)s and SSB(N)s; Squadron MOs - the Squadron including a tender with a 35-bed hospital; UDTs; Medical Research Laboratory and Experimental Diving Unit; Diving School and Naval School Underwater Swimmers; DOD and BUMED.

**Think it over!** For more complete details of the program refer to your Medical News Letter, Vol. 41, No. 11, p. 9, dated Friday, 7 June 1963. For additional information, address your inquiry to Director, Submarine Medicine Division (Code 75), Bureau of Medicine and Surgery, 2300 E St., N. W., Washington 25, D. C.



## MISCELLANY

### URGENT TRAINING NOTICE

#### Applications for Residency Training 1964 - 1965

Interested applicants for residency training, both inservice and outservice, should carefully review BUMEDINST 1520.10B for information concerning programs offered and procedure for submitting applications.

#### Training in Civilian Institutions

Deadline for submission of applications for training in civilian institutions to begin 1 July 1964 or early Fall for academic programs is 15 August 1963. Requests for the following types of training programs will be considered by the Professional Advisory Board at its meeting in early September.

1. Plastic Surgery - completion of 4 years of General Surgery required by Bureau of Medicine and Surgery.
2. Public Health - leads to Masters degree in Public Health and certification by American Board of Preventive Medicine in Public Health.
3. Occupational Medicine - leads to Masters degree in Public Health (in Industrial Health) and certification by the American Board of Preventive Medicine in Occupational Medicine.
4. Aviation Medicine - leads to Masters degree in Public Health and certification by American Board of Preventive Medicine in Aviation Medicine.
5. Neurology - 3-year program in civilian institution.
6. Radiobiology - academic year at the University of Rochester preceded by 9-week academic refresher course (summer session), followed by 4 weeks at Walter Reed Army Institute of Research.
7. Subspecialties of Internal Medicine (Allergy, Gastroenterology, Hematology, and Pulmonary Diseases) - completion of 3 years of formal training in Internal Medicine required by Bureau of Medicine and Surgery.



Applications for Neurosurgery will be considered by the Inservice Professional Advisory Board meeting in November 1963, as the required training in General Surgery (6 months to 1 year) is spent in a naval hospital prior to the civilian training. Those selected will begin the inservice phase during 1964-1965 and the civilian phase during 1965-1966.

Officers may indicate three choices of civilian institutions in order of preference where they desire the training or may request training in a civilian institution to be determined later. However, the Bureau of Medicine and Surgery will make final arrangements for enrollment after approval of the request has been obtained.

Applicants may contact institutions relative to training, but in any correspondence or interviews it should be made clear that acceptance will be contingent upon approval being obtained from the Bureau of Medicine and Surgery.

Only a limited number of individuals will be sponsored in these programs in view of the existent personnel shortage.

#### Inservice Residency Training

Deadline for submission for inservice training programs to begin in the summer of 1964 is 15 November 1963. Candidates will be notified of selection or nonselection by 15 December 1963. Applications, submitted via chain of command, should be for the full training program as outlined in BUMEDINST 1520.10B.

Combined programs, such as in Neurosurgery, should be requested for the inservice portion first to begin in the summer of 1964, with the civilian portion to follow in a civilian institution to be determined.

Applicants are encouraged to list at least three choices of naval hospitals for location of training if such choices exist in the chosen specialty, and may feel free to write the chiefs of services for details of the training offered, if desired.

Early submission of applications is recommended to assure processing through chain of command and receipt in BuMed prior to the 15 November 1963 deadline. —Training Branch, Professional Div., BuMed.

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**NOTICE.** Attention is especially called to BUMED INSTRUCTION 6310.5 which provides instructions for a uniform nomenclature and statistical classification for recording and reporting diagnoses for all patients treated in or accounted for by military medical establishments. Joint Armed Forces Nomenclature and Method of Recording Psychiatric Conditions, NAVMED P-1303, is canceled.

\* \* \* \* \*

Suggestion Awards Average \$40 - Performance \$149

A total of 104,545 Federal employee suggestions were adopted in fiscal year 1962, resulting in measurable benefits to the Government of \$64,828,726. Cash awards to employees totaled \$2,943,468 for an average award of \$40. The rate of employee suggestions adopted was 4.5 per 100 employees.

Awards for superior accomplishment were made to 76,029 employees, varying from scientists to secretaries, from accountants to auto mechanics. The average cash award for superior performance or special achievement was \$149. Government-wide, 3.3% of employees received awards for superior accomplishment.

Equally important to Government's operations are intangible benefits which accrued from these adopted suggestions, such as reduction of safety hazards, improved services to the public, and more effective achievement of the mission of Government agencies. —TIO - BuMed Info Memo, 14 June 1963.

\* \* \* \* \*

Health of American Indians

The American Indian's present health status approximates that of the general population 20 years ago, the Public Health Service recently reported. However, the Service pointed to some improvements in recent years as reflected in various reductions in death and disease rates. It noted that, since 1954, tuberculosis death rates are down 60% among Indians and 83% among Alaska Natives, while infant mortality among Indians has declined by 28%.

In a new booklet, \*The Indian Health Program of the U. S. Public Health Service, released on 15 June 1963, the Service also pointed to these facts:

Birth rates are steadily rising. They are at present almost twice as high as the all-races birth rate. Physicians attended 97% of registered Indian births.

The Indian average age at death has increased three years since 1954, partly because of reduced infant death rates, more people living longer, and reduced death rates associated with preventable diseases.

Leading causes of death among Indians are accidents, heart disease, influenza and pneumonia, malignant neoplasm, and diseases of early infancy.

Death rates due to influenza and pneumonia are about two and four times higher among Indians and Alaska Natives, respectively, than among people of all races.

\*Single copies may be obtained at no charge from Public Inquiries Branch, Public Health Service, Washington 25, D. C.

\* \* \* \* \*



IN MEMORIAM

RADM Richard H. Laning MC USN (Ret)	9 April 1963
RADM Charles E. Riggs MC USN (Ret)	31 May 1963
RADM Luther Sheldon Jr, MC USN (Ret)	22 June 1963
RADM Samuel H. White MC USN (Ret)	28 February 1963
CAPT Roland H. Fogel MC USN (Ret)	15 February 1963
CAPT Albin L. Lindall MC USN (Ret)	9 April 1963
CAPT Louis E. Mueller MC USN (Ret)	22 March 1963
CAPT Fred M. Rohow MC USN (Ret)	4 May 1963
CAPT Stewart W. Shimonek MC USNR (Ret)	30 May 1963
CDR Edward G. Dennis MSC USN (Ret)	10 March 1963
CDR Vincent A. Maslow DC USN (Ret)	26 May 1963
CDR Daniel P. Platt MC USN (Ret)	10 March 1963
LCDR Clarence G. Heiland MSC USN (Ret)	1 March 1963
LCDR Francis H. Webster MC USN (Ret)	29 March 1963
LT Kyrie N. Flowers MSC USN (Ret)	27 February 1963
LT Sarah M. Gibbons NC USN (Ret)	8 March 1963
LT Lawrence E. Horne MSC USN (Ret)	16 March 1963
LTJG Floyd A. Dibling MSC USN (Ret)	11 June 1963
LTJG Leroy F. Millett MSC USN (Ret)	15 June 1963
LTJG William C. Shoemaker MSC USN (Ret)	22 February 1963
ENS Ellsworth R. Robinson MSC USN (Ret)	5 June 1963
CHMEDSERWRNT W-2 Walter R. Wisdom USN (Ret)	21 May 1963
CWO2 Andrew N. Riehm USN (Ret)	20 May 1963
CWO Cedric (N) Brackett USN (Ret)	27 January 1963
CWO Albert C. Gelatte USN (Ret)	18 May 1963
CWO Lerue Petersen USN (Ret)	4 April 1963
CWO Louis A. Roberts USN (Ret)	23 March 1963
CWO Wesley W. Wetmore USN (Ret)	22 April 1963

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Navy Mutual Aid Association

The Navy Mutual Aid Association is a service organization which has been operating continuously since 1879. The control of the Association is vested in its members through a Board of Directors which is elected annually. The Board is composed of distinguished officers who serve without compensation. The Chief of Naval Operations is normally President of the Association.

What They Do

The purpose of the Association is to provide life insurance at as near the actual net cost as possible and to provide the surviving dependents of its



members with immediate financial aid and sympathetic effective assistance in procuring all Government benefits to which they may be entitled. Membership in the Navy Mutual Aid Association offers:

1. An immediate estate of \$10,000 permanent life insurance at the lowest possible cost.
2. Emergency loans without red tape.
3. Repository service for your valuable papers and documents

It offers dependents:

1. Immediate payment of \$1,000 which is wired as soon as casualty report is received.
2. An additional \$9,000 which is paid to your beneficiary in accordance with your wishes.
3. Kindly competent assistance in the preparation, submission, and following up of all claims for Government benefits. Navy Mutual Aid will represent your dependents before the Veterans Administration Appeals Board if necessary and without cost.

It provides:

A sense of security and peace of mind which comes from knowing that Navy Mutual Aid will be available for understanding assistance with problems in time of emergency.

Who Is Eligible?

Membership is limited to officers of the Navy, Marine Corps, and Coast Guard on active duty, including Reserve officers on extended active duty for at least one year. Midshipmen at the U. S. Naval Academy and cadets at the U. S. Coast Guard Academy are also eligible. Membership may be retained after separation from the service.

Plans of Insurance Offered

Navy Mutual Aid provides a primary benefit of \$7,500 plus a terminal dividend of \$2,500 payable on death. Adequate reserves have been established to insure the full payment of the terminal dividend in all cases.

Premiums are based on the \$7,500 primary benefit. The terminal dividend of \$2,500 is available at no additional cost or restrictions as to the duration of membership. Members may elect one of five simple plans of permanent insurance: paid up at age 50, 55, 60, 65, or payable for life (whole life). The Association operates on a level premium, legal reserve basis. Substantial cash or loan values are available after one year.

Payment of Premiums

It should be noted that the By-Laws require that premiums be paid by allotment, if practicable. No interest charges are levied for the privilege of paying



by monthly installments. Monthly premiums are one twelfth of the annual premium. Members who do not have allotment privileges may pay quarterly, semiannually, or annually.

An extra aviation premium is required of all members under 45 years of age who are assigned to duty involving flying and are in receipt of extra hazardous duty pay. The rate is \$7.50 per month for members 29 years of age and younger, and \$3.75 per month for members age 30 to 45.

Additional information may be obtained from the Navy Mutual Aid Association, Navy Department, Washington 25, D. C.

—Information Bulletin, Service Force,  
Atlantic Fleet, Vol. 1, March 1963.

\* \* \* \* \*

### FROM THE NOTE BOOK

#### Admiral Kenney Honored by University of Cincinnati

The Surgeon General, Rear Admiral E. C. Kenney MC USN, upon the recommendation and approval of the Board of Directors of the University of Cincinnati, had conferred upon him the honorary degree of Doctor of Laws on 9 June 1963. At the same time that he received this honorary degree, Admiral Kenney also delivered the commencement address at the University of Cincinnati to the graduates of the graduate and professional schools (including the College of Medicine, Nursing, and Pharmacy).

#### Captain Cone to Represent DOD on National Advisory Council

Shirley C. Fisk MD, Deputy Assistant Secretary of Defense (Health and Medical) sent the following memorandum to the Surgeon General, Rear Admiral Edward C. Kenney MC USN on 18 June 1963.

"It gives me pleasure to inform you that Captain Thomas E. Cone MC USN has been selected to represent the Department of Defense on the National Child Health and Human Development Council. The Surgeon General, Public Health Service, will contact Captain Cone directly concerning the schedule of meetings of this Council.

I wish to express my appreciation for your cooperation in this matter. "

NOTE: Captain Cone has long been recognized as one of the Navy's and the Nation's most outstanding Pediatricians. He has served with distinction in all of his assignments, including the current duty as Chief of the Pediatric Service, U. S. Naval Hospital, NNMC, Bethesda, Md. He has a flair for

productive clinical research as well as the practice of his specialty according to the highest standards. He has a noteworthy record as a teacher of interns and residents in Pediatrics. Success of his programs and his personal popularity are attested by the fact that, each year, there are far more applications for residency training with him than there are training billets open on his Service. So, to Doctor Cone - WELL DONE INDEED!—Editor

NMRI Frostbite Expert Aids Everest Conquerors. LT E. D. Mundth MC USNR, Experimental Surgery Division, NMRI, NNMC, flew to Katmandu, Nepal at the request and expense of the National Geographic Society to act as consultant in the treatment of the two Mount Everest climbers who suffered from severe frostbite, Barry C. Bishop, Washington, D. C., and William Unsoeld, Eugene, Oregon. Dr. Mundth carried a supply of the experimental drug, low molecular weight dextran, designed to improve the flow in small blood vessels. The men received a 6-day course of therapy with the drug. On the basis of skin temperature observations and gratifying clinical improvement, Dr. Mundth felt that the treatment had improved the blood flow to questionably viable tissue and is hopeful that the eventual tissue loss will be minimal. —NMRI Notes, No. 6, June 1963.

#### Naval Medical Research Reports

U. S. Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md.

1. Structural Transitions in Antibody and Normal  $\gamma$ -Globulins - I. Molecular properties: MR 005.06-0001.01 Report No. 17, October 1961
2. Structural Transitions in Antibody and Normal  $\gamma$ -Globulins - II. Fluorescence Polarization Studies: MR 005.06-0001.01 Report No. 18, October '61.
3. Freeze-Drying of Bovine Spermatozoa: MR 005.02-0001.07 Report No. 9, August 1962.
4. Cell Cultures for Detection of Trachoma Virus from Experimental Simian Infections: MR 005.09-1200.05 Report No. 2, October 1962.
5. Mechanochemical Basis of Muscular Contraction: MR 005.08-0020.01 Report No. 7, December 1962.
6. Use of Tris (Hydroxymethyl) Aminomethane Buffer in Moving-Boundary Electrophoresis of Serum: MR 005.02-0011.01 Report No. 1, Dec 1962.
7. Curare-Binding Macromolecules from Medullated Nervous Tissue: MR 005.06-0010.01 Report No. 28, December 1962.
8. Device for Generating Zero, Linear, or Exponential Gradients or Their Combinations: MR 005.2-1100.04 Report No. 1, January 1963.
9. Effect of Cell-Free Spleen Extract on Bone Marrow Megakaryocytes of Irradiated Guinea-Pigs: MR 005.08-1300.03 Report No. 11, January '63.
11. Isolation of a Radiation-Mortality Reducing Factor from Spleen: MR 005.08-1300.03 Report No. 13, January 1963.
12. Functional Basis for "On"-Center and "Off"-Center Receptive Fields in the Retina: MR 005.13-1500.05 Report No. 7, January 1963.



13. Preservation of Living Cells: MR 005.02-0001.07 Report No. 8, January 1963.
14. Trematode Parasites of Fishes from Egypt - III. Six New Hemiuridae: MR 005.09-1606.01 Report No. 2, January 1963.
15. Psychologic Discomforts in 1962 Protective Shelter Tests: MR 005.12-2003.01 Report No. 2, February 1963.
16. Seminar on Immunity to Parasitic Helminths - IV. Schistosome Infections: MR 005.09-1031.01 Report No. 11, February 1963.
17. Nutritional Aspects of a Shelter Habitability Study with Ninety-Six Recruits: MR 005.02-0001.09 Report No. 2, February 1963.
18. Structural Transitions of Soybean Trypsin Inhibitor - I. The Native Protein in Water: MR 005.06-0001.01 Report No. 19, March 1963.
19. Structural Transitions of Soybean Trypsin Inhibitor - II. The Denatured State in Urea: MR 005.06-0001.01 Report No. 20, March 1963.
20. Accidental Human Trachoma with Rapid Diagnosis by a Cell Culture Technique: MR 005.09-1200.05 Report No. 1, March 1963.
21. Serologic Reactions to Schistosoma Mansoni - I. Quantitative Studies on Experimentally Infected Monkeys (Macaca Mulatta): MR 005.09-1033.01 Report No. 4, March 1963.
22. Serologic Reactions to Schistosoma Mansoni - II. Quantitative Studies in Human Patients Treated with Stibophen: MR 005.09-1033.01 Report No. 5, March 1963.

U.S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Penna.

1. Theory of Enzyme Kinetics Based on Electron Conduction Through the Enzymatic Particles, with Application to Cytochrome Oxidases and to Free Radical Decay in Melanin: MR 005.13-0002.7 Report No. 19, May 1963.

U.S. Naval Medical Research Unit No. 2, APO 63, San Francisco, Calif.

1. Field Studies of Protection from Infection by Experimental Trachoma Virus Vaccine in Preschool Aged Children on Taiwan: MR 005.09-1201.12.23, December 1962.
2. Classification of Trachoma Virus Strains by Protection of Mice from Toxic Death: MR 005.09-1201.12.22, December 1962.
3. Japanese Encephalitis on Taiwan: Lecture and Review Series Report No. 62-4, December 1962.
4. Some Host-Parasite Relationships of Japanese Encephalitis Virus in Taiwan: MR 005.00-1201.2.11, December 1962.
5. Serial Propagation of Sagiyama Virus in Several Primary and Continuous Cell Cultures: MR 005.09-1201.13.2, December 1962.

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Correction: In the Medical News Letter of 21 June 1963, article, "Medico-legal Aspects of Sobriety Examinations," page 12, 4 lines from end of the first paragraph, the word "with" should read "without."

## DENTAL



## SECTION

Marginal Leakage of Amalgam Restorations

Walter J. Baumgartner, B.S., D.D.S.,\* Robert E. Bustard, D.D.S.,\*\* and Richard F. Feierabend, D.D.S.\*\* J Pros Den 13(2): 346-353, March-April 1963.

The random selection of teeth restored with amalgam for 5 years or more was presumed to represent an average dental effort. None of them exhibited fractures, nor were the teeth extracted because of the restoration failure. The ratio of mercury to alloy, the method of condensation, and the exclusion of moisture were all unknown. The only available information was that the restorations were inserted by dentists at least 5 years earlier. On this basis, it was assumed that the amalgam restorations represented average dental performance.

The restored teeth were tested to establish whether or not an average amalgam restoration would eventually provide an adequate seal. Experimentally, this is so. However, in practice, 80% of the amalgam restorations showed leakage after 5 or more years (Table I).

TABLE I. AMALGAM RESTORATIONS IN PRACTICE

CLASS	NO. OF TEETH	CLINICALLY ACCEPTABLE	CLINICALLY UNACCEPTABLE	LEAK BY ISOTOPE TEST	RECURRENT CARIES
1	25	12	13	19	4
5	5	2*	3	3	0
2	17	10	7	16	5

\*Did not extend to marginal gingiva.

Nothing was known of the technique used by the dentists. From the sections, the cavity preparations were acceptable. If we examine the "plug" type filling, Class I or Class 5 as the equivalent of the Class 5 used experimentally,

\*Chief of Dental Service, Kansas City, V. A. Hospital and Clinical Associate Professor, University of Kansas City School of Dentistry

\*\*Dental Intern, Kansas City, V. A. Hospital



the incidence of recurrent caries was small. Only 4 of 30 restorations had recurrent caries, while 22 of the 30 showed leakage.

The gingival wall is a critical area of the Class 2 amalgam; it is rarely visible. It is a difficult area to finish both from the standpoint of the cavity preparation and the restoration. The patient's ability to maintain good hygiene at the gingival margin is questionable. Of the 17 gingival walls of the Class 2 amalgams examined, 16 showed leakage, of which 5 had recurrent caries. Add to this the three Class 5 restorations which leaked to the gingival wall and we can categorically state that this is a critical area.

If one examines the total result, the evidence points to the conclusion that (1) the clinical evaluation is unreliable, (2) marginal leakage is to be expected, and, therefore (3) recurrent caries is the only basis for replacing a restoration.

While marginal leakage occurred at the interface of enamel and amalgam, and in most instances at the dentinal amalgam interface, the radioisotope failed to penetrate beneath the cement bases found in several restorations. It is paradoxical that zinc phosphate cement which leaks after 24 hours under laboratory conditions provided a better seal than the overlying amalgam in clinical situations.

In testing marginal leakage with two different methods of condensation, it becomes obvious that, all other things being equal, the technique of amalgam condensation cannot be ignored. By condensing amalgam against the walls of the cavity, the plashy amalgam is brought to the center of the restoration. This is discarded during condensation. The higher mercury content usually found at the margins may well be reduced. Therefore, condensing amalgam against all the walls should provide a better seal and should become general practice.

In the final analysis, what occurs in the patient's mouth is the ultimate test. The average amalgam restoration inserted in patients' teeth may be said to leak, both immediately after insertion and indefinitely thereafter.

This report cannot help but be critical of the isotope test. All restorations leak. However, the formation of dead tracts in peripherally exposed dentin and the formation of secondary dentin tend to provide a markedly less permeable tissue between the cavity preparation and the pulp.

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## Conclusions

1. Most amalgam restorations in service 5 or more years show marginal leakage as demonstrated by  $I^{131}$  penetration.
2. The most frequent occurrence of marginal leakage is at the gingival wall.
3. Recently inserted amalgam restorations condensed against all walls in test Class 5 cavities provide a better initial seal than those condensed against the axial wall.

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### Influence of Factors on Setting Expansion

David B. Mahler, PhD., and A. Bruce Ady, B.S., University of Oregon Dental School, Portland, Ore. "The Influence of Various Factors on the Effective Setting Expansion of Casting Investments," J Pros Den 13(2):365-373, March-April 1963.

In this investigation, measurement was made of the effective setting expansion of casting investments in and around wax patterns invested in asbestos-lined rings, and the influence of various factors on this expansion was determined. The following conclusions appear to be indicated for the investments and conditions investigated in this study.

1. Effective setting expansion is not the same as linear trough expansion. Expansion of the investment away from the wax pattern is relatively small, whereas expansion of the investment surrounded by the wax pattern is relatively large.

2. The vertical position of the wax pattern in the ring is one of the most significant factors influencing the effective setting expansion and, within the practical limits imposed by venting and investment strength, the position of the pattern should be carefully considered.

3. Manipulative conditions which increase expansion compared to a standard condition are over spatulation and a thick mix, with the latter more influential. Both of these factors significantly affect the thermal technique but have little influence on the hygroscopic technique investigated.

4. Greased and dry asbestos liners tend to decrease effective setting expansion, while loose and double asbestos liners tend to increase it.

5. The use of a softer wax results in greater effective setting expansion.

\* \* \* \* \*

### Personnel and Professional Notes

Dental Officers, 11th Naval District, Honor Dental Society. A Professional Military Symposium sponsored by dental officers of the Eleventh Naval District, honoring members of the San Diego County Dental Society, was held on 10 June 1963 at the U. S. Naval Training Center, San Diego, California.

A panel presentation, "The Battle of Occlusion in Periodontics," was made by:

Capt Allan L. Wallace, DC, USN, U. S. Naval Dental Clinic, Marine Corps Base, Camp Pendleton, California

Cdr Perry C. Alexander, DC, USN, U. S. Naval Dental Clinic, Long Beach, California

LCdr Walter N. Johnson, DC, USN, Senior Dental Officer,  
USS SPERRY (AS-12)

#### Table Clinics

Presented by dental officers attached to Naval Amphibious Base, Coronado, California:



LCdr Joseph E. Hartnett, DC, USN  
 Lt John C. Edwards, DC, USNR  
 Lt Harry Nadler, DC, USNR

Periodontal-Prosthetic  
 Therapy

Presented by dental officers attached to Naval Training Center,  
 San Diego, California:

Lt Isaac K. Hawkins, DC, USNR  
 Lt Laurence S. Pitcher, DC, USNR

Mechanical Mixing of  
 Cement Silicates

Presented by dental officers attached to Naval Dental Clinic, Marine  
 Corps Base, Camp Pendleton, California:

Capt Glenn D. Richardson, DC, USN  
 Capt Stewart T. Elder, DC, USN

Tissue Distortion Caused by  
 Impression Making, the Mate-  
 rials Used and Type of Trays

"Closed Circuit Television Demonstration on the Technical Procedures  
 in Making a Mouth Protector" - presented by Capt Richard V. Peterson,  
 DC, USN, Naval Dental Technicians School, U. S. Naval Training Center,  
 San Diego, California.

Newly Standardized Items Available for Issue.

FSN	Nomenclature	Unit Issue	Unit Price
6515-865-2687	Suture, Nonabsorbable, Surgical Silk, Braided, Size 000, Single Armed, 12's	PG	2.50
6520-889-5726	Dispenser, Mercury, Dental, Screw Cap	EA	3.05
6520-889-5727	Capsule and Pestle, Dental Amalgamator 12's	PG	1.60
6520-889-5781	Bur, Dental, Excavating, Friction Grip Angle Handpiece, Tungsten Carbide, No. 34, 6's	PG	2.50
6520-889-5782	Bur, Dental, Excavating, Friction Grip Angle Handpiece, Tungsten Carbide, No. 1/2, 6's	PG	2.50
6520-889-5783	Bur, Dental, Excavating, Friction Grip Angle Handpiece, Tungsten Carbide, No. 558, 6's	PG	2.60
6520-889-5784	Bur, Dental, Excavating, Friction Grip Angle Handpiece, Tungsten Carbide, No. 33-1/2, 6's	PG	2.50
6520-889-6565	Holder, Amalgam Capsule, Dental, Plastic	EA	.50
6525-899-0217	Film, Radiographic, Dental, 1-1/4" by 1-5/8", 150's	PG	4.25

Rear Admiral Fisher Lectures at Naval Dental School. RAdm Alton K. Fisher,  
 DC, USNR, Professor and Head of Stomatology, University of Iowa, Iowa City,  
 Iowa, recently lectured on "Tissue Metabolic Research in Arctic Alaska" to

staff, resident, and postgraduate officers at the U. S. Naval Dental School, Bethesda, Maryland, on Friday, 17 May.

Admiral Fisher began his professional career as an Anthropologist with the Milwaukee Public Museum and did research in archeology and paleopathology. He has served as Vice President of the Wisconsin Archeological Society.

Admiral Fisher has also served as the President of the Research Club of Iowa and as Vice President of the American Academy of Oral Pathology. He is the author of numerous articles on Pathology in medical and dental publications.

Captain Frechette Participates in Southeastern Georgia Dental Society Meeting.

Capt Arthur R. Frechette, DC, USN, Commanding Officer of the U. S. Naval Dental School, Bethesda, Md., lectured recently to the Southeastern Georgia Dental Society at Jekyll Island, Ga. His topics were "Improved Partial Dentures" and "Treatment of Abnormal Occlusion and Temporomandibular Joint Problems with Prosthetic Appliances."

Dr. Updegrave Lectures at the Naval Dental School. Dr. William J. Updegrave, Professor of Radiodontics, Temple University School of Dentistry, Philadelphia, Pennsylvania, recently lectured on "Temporomandibular Joint Radiography, Technique and Interpretation" to staff, resident, and postgraduate dental officers, and civilian and military guests, at the U. S. Naval Dental School, Bethesda, Maryland.

The program was televised from the National Naval Medical Center by closed circuit to other medical and dental activities in the local area.

Dr. Updegrave is a Fellow of the American College of Dentists and has served as Chairman of the Philadelphia Section. He has served as President of the American Academy of Oral Roentgenology and as President of the Academy of Stomatology. He was Chairman of the Section on Roentgenology of both the American Association of Dental Schools and the American Dental Association.

The author of many articles, Dr. Updegrave has lectured and presented clinics at numerous dental schools throughout the United States.

Captain Conant Certified a Diplomate of the American Board of Periodontology.

Capt Julian R. Conant, DC, USN, has been informed by the American Board of Periodontology that he has successfully passed the examinations of that Board and has been certified a Diplomate.

\* \* \* \* \*





## OCCUPATIONAL MEDICINE

### Vapor Toxicity of UDMH in Rats and Dogs from Short Exposures \*

Maurice H. Weeks, George C. Maxey, Mary E. Sicks, and Earle A. Greene, Directorate of Medical Research, U. S. Army Chemical Research and Development Laboratories, Army Chemical Center, Md. Industrial Hygiene Journal 24(2): 137-143, March-April 1963.

A study was made of the inhalation toxicity of UDMH in animals from single short exposures. Five- to sixty-minute exposure of dogs and rats to high concentrations of UDMH produces toxic signs similar to those resulting from longer inhalation exposures. No clinical abnormalities resulted from these single short-term exposures. Dogs exposed to 50, 200, and 600 ppm of UDMH for single or multiple periods of 60-, 15-, and 5-minutes duration, respectively, showed no adverse physiological effects. These levels of UDMH can serve as a basis from which short-term exposure standards may be estimated for man. Dogs retained about 80% of the inhaled UDMH.

The use of 1, 1-dimethylhydrazine (UDMH) as a storable liquid fuel in advanced missile systems has resulted in the need for additional information on the health hazards from single, short exposures to this compound. The conditions of exposure will likely involve large amounts of agent for short periods of time. Investigations of the toxicology of UDMH have shown it to be primarily a central nervous system stimulant causing convulsion and death irrespective of the route of administration. Inhalation of its vapors may also cause respiratory irritation, anemia, and lethargy.

A hygienic standard or threshold limit value of 0.5 ppm UDMH vapor has been recommended. This value should be safe during a normal 8-hour workday, five days a week, for the life of the worker. However, brief exposures to much higher concentrations may occur in some situations, and our knowledge of UDMH poisoning is insufficient to predict adequately the levels of human tolerance from such exposure. The effects resulting from a few accidental exposures have been reported in the literature, but circumstances in such situations do not contribute to establishing well defined values for exposure times or for concentration levels.

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\* This does not represent a full report of the article

The purpose of the authors' study was to obtain data on the inhalation toxicity of UDMH in animals from single, short exposures. Results from these controlled experiments will help to establish short-term exposure standards for UDMH.

The present paper reports the effects of both single exposure of rats and dogs and of repeated exposure of dogs to UDMH vapor. The experiments with rats were designed to determine the range of concentrations producing severe toxic effects from exposure for single 5-, 15-, and 30-, and 60-minute periods. The objective of the experiments with dogs was to find the concentration of UDMH causing minimal or no toxic signs at these short exposure periods.

It is apparent that single brief exposures to high concentrations of UDMH produced toxic signs similar to those seen on longer inhalation exposures at lower concentrations and on poisoning by other routes. The similarity in the toxic effects from both long- and short-term exposures suggests a common mechanism of action of UDMH dependent upon the total dose. This is further demonstrated by the linearity resulting when the  $LC_{50}$  values of UDMH for rats are plotted on coordinates of logarithms of concentration versus logarithm of time.

The ranges of concentration causing deaths of dogs from single 5-, 15-, and 60-minute exposures were lower than those causing deaths of rats. This reflects the known greater sensitivity of the dog over the rat to UDMH. The toxic signs in order of appearance and severity in the dogs at these levels were usually as follows: a dazed appearance, vomiting, tremors, convulsions, and death.

Because of the lack of sufficient knowledge on the mechanism of action of UDMH and of some measurable change as an index of exposure, the criterion of toxicity in the minimal toxic response studies was limited to the observation of toxic signs. However, the observation of toxic signs resulting from UDMH exposure was aided by the finding that UDMH causes a hypersensitivity in exposed dogs to sharp noises and quick, unexpected movements. These added stresses or stimuli seemed to magnify or perhaps hasten the development of signs from UDMH poisoning. Under these conditions minimal toxic responses were produced by exposure to about 1200, 400, and 100 ppm of UDMH from single 5-, 15-, and 60-minute exposures, respectively.

Dogs repeatedly exposed at 50, 200, and 600 ppm of UDMH for six weeks at 60-, 15-, and 5-minute periods, respectively, showed no changes from normal in reflexes, blood values, and lack of signs, which indicate that these concentrations of UDMH at the various short-term exposures were non-toxic for dogs. The data suggest that the effects of these twice-weekly exposures were not additive, i. e., the dogs recovered from the effects of one exposure before the next. Comparison of the results from the two experiments at exposure levels of 100 and 1200 ppm of UDMH for 60- and 5-minute periods, respectively, indicates that no increase in sensitivity developed in dogs exposed six weeks at the lower dose levels.

The absence of abnormalities from the short-term exposure to show that at present there is no measurable change produced as a result of exposure



to UDMH which will serve as a reliable index of exposure. The threshold concentrations of UDMH to dogs were 50, 200, and 600 ppm of UDMH for single 60-, 15-, and 5-minute periods, respectively. These data provide a basis from which hygienic standards for short-term exposure to UDMH may be derived for man.

\* \* \* \* \*

#### A Calibration Test Procedure for Combustible Gas Indicators

Submitted by Mr. R. E. Byrd, Industrial Hygienist, USNAS, Jacksonville, Florida.

n-Hexane with a Flash Point of  $-7^{\circ}$  F (closed cup) and a lower explosive limit of 1.25% by volume in air, is satisfactory for field calibration of combustible gas indicators to be used with petroleum vapors.

A 55-gallon drum offers a convenient volume and is readily available. The drum must be chemically clean and have an even top with a rubber gasket to permit a tight fit of the cover; drums having contained trichlorethylene only can be used without further cleaning after thorough air-drying.

Addition of the exact quantity of n-Hexane and thorough mixing to assure complete vaporization are essential!

With the sampling tube removed, add exactly 7.0 milliliters of n-Hexane with transfer pipet or buret into the 55-gallon drum through the sampling tube opening, then quickly insert the sampling tube. Stir the air and vapor mixture for 5 minutes.

Attach the intake tube of the combustible gas indicator to the sampling tube of the drum; open the pinch clamp and draw the air and vapor mixture through the indicator until a constant reading is obtained (usually 2 to 5 squeezes). Close the pinch clamp and stir the air and vapor mixture an additional 3 minutes, then test again with the indicator; this procedure should be repeated until a constant reading is obtained. Calibration must be done at temperatures above  $70^{\circ}$  F. Reading of the indicator should be near the 100% mark; any reading between 50% and 100% is acceptable.

If meter reading is less than 50% it is not satisfactory for use; replace batteries, then retest; if still below 50% replace filament then retest; if still too low the indicator should be repaired and recalibrated, usually by the manufacturer, or surveyed. Some models (MSA Model 20 and possibly others) can be recalibrated by a simple adjustment; however, the small unit such as MSA Model 2 cannot be recalibrated in the field.

If meter reading is off scale above the 100% mark, the unit is probably too sensitive, but it can be used safely because the error is on the conservative side.

The listed volume of 7 ml of n-Hexane in a 55-gallon (208 liters) drum gives 50% of the lower explosive limit. Good practice suggests that some factor of safety should be incorporated; combustible gas indicators should be

calibrated to read at or very near the 100% explosive concentration in the presence of 50% of this concentration.

\* \* \* \* \*

### The Toxicology of Methyl Chloroform

Richard D. Stewart, M.D., Midland, Michigan. J Occup Med 5(5): 259-261, May 1963.

Methyl chloroform, 1, 1, 1-trichloroethane, has become an increasingly popular solvent in recent years because of its low toxicity. It has been used primarily for cold-cleaning, dip-cleaning, and bucket-cleaning of metal for the removal of greases, oils, and waxes. Its use as a solvent in several other applications is being investigated, e. g., agricultural chemicals, dry cleaning, and vapor degreasing. Because of its increasing use and since it has been promoted as a carbon tetrachloride substitute, it is appropriate for the physician to examine the existing toxicological information.

The 1, 1, 2-isomer, a more toxic compound, has had only limited use in the laboratory and will not be included in the discussion to follow. Physical and Chemical Properties - 1, 1, 1-Trichloroethane,  $\text{CH}_3\text{CCl}_3$ , is a colorless liquid possessing a distinctive, chloroform-like odor. It has a specific gravity of 1.336 at 25° C, a vapor pressure of 127 mm Hg at 25° C, and a boiling point of 74.1° C. This compound is readily soluble in organic solvents such as carbon bisulfide and carbon tetrachloride, but it is only slightly soluble in water. Like many chlorinated hydrocarbons it reacts with aluminum and aluminum alloys and must be inhibited if corrosion is to be prevented. Inhibited formulations are marketed under various trade names.

1, 1, 1-Trichloroethane is not flammable, nor will it support combustion. The limits of flammability of the vapors of the inhibited compound are 10-15.5% in air with hot wire ignition only when considerable energy is used for ignition. It has no flash point or fire point using the standard ASTM procedures for the Tag closed-cup and Cleveland open-cup tests.

Only minimal thermal decomposition may be induced at temperatures below 500° F; at 500° F large amounts of hydrogen chloride and trace amounts of phosgene are formed. Sufficient hydrogen chloride is formed to provide adequate warning.

Adsorption, Metabolism, and Excretion - 1, 1, 1-Trichloroethane is rapidly absorbed through the lungs and the gastrointestinal tract. It may be absorbed in toxic quantities through the intact skin if trapped against the skin beneath an impermeable barrier. Following absorption, most of the compound is eliminated unchanged via the lungs. Nearly 98% was excreted unchanged in the expired air of the rat following an intraperitoneal injection of C-labeled compound. One-half percent of the dose was metabolized to carbon dioxide while the remainder appeared in the urine as the glucuronide of 2, 2, 2-trichloroethanol.



## Toxicity

Acute Vapor Exposure - The principal toxic action of a single vapor exposure is a functional depression of the central nervous system, proportional to the magnitude of exposure, and typical of an anesthetic agent.

Humans exposed to 900-1000 ppm experience transient, mild eye irritation and prompt, though minimal, impairment of coordination. Below the current Threshold Limit Value of 500 ppm no physiological effects have been observed. Above 1700 ppm obvious disturbances of equilibrium in humans have been observed. Exposures of this magnitude also may induce headache and lassitude. Nausea has not been reported.

Anesthesia in a human volunteer was maintained uneventfully for 30 minutes. No significant electrocardiographic changes occurred during anesthesia; the blood pressure stabilized at 70% of the preanesthetic value. Recovery was slow, but uneventful. The subject complained of being tired for several hours after anesthesia.

Three human deaths as a result of over-exposure to 1, 1, 1-trichloroethane have been reported. One death occurred in an open tank in which vapor concentrations exceeded several thousand ppm, and in 2 cases, death followed exposure to very high concentrations in unventilated tanks.

Vapor exposures in experimental animals have been the basis for most of our understanding of the effects of 1, 1, 1-trichloroethane on man. Acute deaths in experimental animals presumably have been due to central nervous system depression culminating in respiratory arrest. A vapor concentration of 18,000 ppm for 3 hrs. was lethal for 50% of exposed white rats; a 3-hr. exposure to 10,000 ppm produced irregular respiration and a semicomatose state, but no deaths resulted.

There is a modest safety factor present in that the ratio between the concentration of the vapor causing the loss of reflexes and that producing death in mice is 20, as compared to 15 for chloroform.

A disturbing property of this compound is that, at anesthetic concentrations, idioventricular rhythms may be induced in animals with epinephrine. Therefore, it is possible that ventricular fibrillation leading to sudden death could occur in humans exposed to anesthetic concentrations. This is not a unique property of 1, 1, 1-trichloroethane, but one common to most of the chlorinated aliphatic hydrocarbon solvents.

Studies conducted on dogs and monkeys anesthetized with 1, 1, 1-trichloroethane by a closed technique revealed no significant change in electrocardiograms during 60 min. of deep surgical anesthesia; however, a depressor response upon the blood pressure was observed. At the point of respiratory arrest, the blood pressure was reduced to approximately one-half of its normal value. This is in contrast to the minimal blood pressure depression produced by ethyl ether-induced respiratory arrest.

Rats deeply anesthetized with 1, 1, 1-trichloroethane for one hour showed a 33.3% diminution in oxygen uptake of the myocardium, very similar to that observed with chloroform anesthesia.

The failure of 1, 1, 1-trichloroethane to impair significantly liver function in mice, as measured by the prolongation of pentobarbital sleeping time, has been reported by Plaa et al. The hepatotoxic potency of the chlorinated hydrocarbons studied, arranged in order of increasing toxicity was: 1, 1, 1-trichloroethane, tetrachloroethylene, trichloroethylene, tetrachloroethane, 1, 1, 2-trichloroethane, chloroform, and carbon tetrachloride.

To produce histological evidence of liver injury in white rats, vapor concentrations of 8000 ppm for 7 hrs. were required. A 5-hr. exposure at the same concentration did not result in histological evidence of liver injury.

Repeated Vapor Exposure - It is unlikely that significant organic injury resulting from repeated vapor exposure will occur in the absence of acute effects. No injury to man following repeated exposures to vapor concentrations of less than 500 ppm has been observed. Rats, guinea pigs, rabbits, and monkeys were unaffected after 6 months of repeated 7-hr. exposures, 5 days per week to 500 ppm.

Of the laboratory animals investigated, the guinea pig appears most prone to liver injury. While an earlier study reported no organic injury after 3 months of repeated daily exposure to 1500 ppm, 7 hrs. per day, a later study reported the presence of slight lung and liver pathology in guinea pigs exposed repeatedly to 1000 ppm for 1.2 hrs. per day, or 2000 ppm for 0.5 hr. per day. This inconsistency merits further investigation.

Ingestion - Absorption of a substantial amount of 1, 1, 1-trichloroethane from the gastrointestinal tract will produce the same functional depression of the central nervous system as described following vapor inhalation. If the amount ingested is sufficient to produce loss of consciousness, impairment of liver function may result.

Eye Contact - Several drops of 1, 1, 1-trichloroethane placed directly on the cornea may produce a mild conjunctivitis which will subside within a few days.

Skin Contact - Prolonged or repeated contact with the skin results in slight irritation, secondary to the solvent's defatting action. Significant skin absorption is unlikely in industrial applications unless the compound is confined to the skin surface beneath an impermeable barrier.

#### Diagnosis of Exposure to 1, 1, 1-Trichloroethane

The diagnosis of exposure to 1, 1, 1-trichloroethane may be confirmed by detection of the compound in the expired air, blood, or tissue of the individual. If the exposure has been significant, the compound will be present in the expired breath in sufficient concentration to allow specific identification by simple infrared spectrographic techniques in the immediate postexposure period.

The concentration in the expired air and in the blood is directly related to several factors; (1) the concentration of the vapor inhaled; (2) the duration of exposure; (3) the time elapsed following exposure; (4) the breathing rate of the individual during the exposure; and (5) the whole-blood lipid concentration. The latter two factors account for most of the individual variation noted among persons who have experienced identical exposures. For



example, a vapor exposure of 500 ppm for 1 hr. resulted in expired air concentrations of  $22 \pm 5$  ppm in a group of individuals 1 hr. following exposure. This decreased to  $1.5 \pm 0.5$  ppm, 20 hrs. following exposure. When the vapor exposure was extended to 3 hrs., the expired air concentration was in the range of  $38 \pm 1$  ppm 1 hr. after exposure and  $3 \pm 1$  ppm 20 hrs. after exposure. Limited expired air data have been published.

Expired air for infrared analysis may be collected in 6-L. -volume Saran bags. The bagged air is introduced into a long path-length gas cell and the absorbance at  $9.2\mu$  is measured to determine the concentration. The exponential elimination of the compound in the expired air may be followed for a prolonged period of time with the use of the electron capture detector. While this device possesses exquisite sensitivity, it does lack the specificity of the infrared spectrographic method.

Following a vapor exposure, the blood concentration decreases exponentially and may not be detected by infrared methods unless the vapor concentration has approached anesthetic levels.

### Clinical Laboratory Tests

Very limited human data have been published regarding laboratory test findings of exposure to this compound. From the information available, it appears that the urinary urobilinogen excretion may be the most sensitive index of liver insult following exposure. An increase in urinary urobilinogen has been observed on the seventh day following vapor exposures ranging from 900 to 2650 ppm. Other liver function studies, including the serum transaminases, remained normal. The significance of such a finding remains obscure, but this delayed elevation of the urinary urobilinogen following exposure to other chlorinated hydrocarbons has been observed.

### Treatment

There is no specific treatment for 1, 1, 1-trichloroethane intoxication. Prompt supportive measures should be utilized to combat the effects of central nervous system depression. Oxygen with carbon dioxide should be administered. Breathing should be assisted if the respiratory center fails to respond to the carbon dioxide stimulation.

Severe hypotension may be induced by a combination of central nervous system depression and myocardial anoxia secondary to poor oxygen uptake. Unless the situation is desperate, epinephrine must not be used to combat this hypotension because of the danger of inducing ventricular fibrillation.

It is not anticipated that permanent organic injury will result following recovery from the anesthetic effects of the compound.

### Summary

1, 1, 1-Trichloroethane (methyl chloroform), a popular solvent and carbon tetrachloride substitute, is rapidly absorbed through the lungs and the

gastrointestinal tract. Most of the compound is eliminated unchanged via the lungs. The absorption of a toxic quantity results in a functional depression of the central nervous system which may result in death from respiratory arrest or peripheral vascular collapse.

The diagnosis of exposure to this compound may be confirmed by specifically identifying it in the expired breath of the exposed person. Using the expired-air data, it may be possible to make a crude estimate of the magnitude of the exposure.

No detrimental effect upon man has been observed when vapor exposures have not exceeded 500 ppm.

\* \* \* \* \*

#### Miscellaneous Hazards

Quarterly Report on Occupational Health Activity of Department of HEW, PHS, Occupational Health Division, Washington 25, D. C., pp. 10, 11, 13, 17, January 1 - March 31, 1963.

#### Mercury Exposure in Homes

Recently three cases of mercury poisoning among children were reported to the Division of Occupational and Radiological Health. Five members of a family living in an outlying area in Eastern Colorado were affected.

The father of the children involved brought home about 400 grams of mercury, half of which was lost by spillage over a period of 2 or 3 months. Although all three children showed symptoms of mercury poisoning, a 1-year-old baby became acutely ill and final diagnosis was eventually made by the collection of urine samples.

Urinary samples from all members of the family showed 500-800 micrograms of mercury per liter of urine. Air samples collected throughout the house showed a uniform distribution of mercury of about .08 to .12 milligram per cubic meter of air about three feet from floor level.

Attempts to clean and tie up the mercury are continuing. At this time, the concentration within the house has dropped to .04 milligram per cubic meter of air—not low enough to permit the owners to return to the house.

A number of individuals selected at random remembered that at one time or another mercury was brought into the home either by the children or by parents for the children to play with. In addition, in two neighborhoods young children had canvassed their area asking for broken thermometers and were collecting mercury in a bottle, drop by drop. As a result, statewide warnings were issued by press and radio alerting parents to the dangers involved and recommending that children not be permitted to collect mercury and that it be kept out of homes.

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### Transport of Missile Fuels

The Division has found that several companies are engaged in repairing tank trucks involved in the transport of unsymmetrical di-methylhydrazine (UDMH). Although the tanks are emptied and filled with nitrogen before repairs, it is occasionally necessary for workers to reach inside the tanks, with resulting skin exposures. Recommendations were issued to prevent skin exposures and accidental exposures to UDMH vapors as well as to reduce the possibilities of fire or explosion.

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### Indoor Rifle and Pistol Ranges - Lead Exposure Hazard

With the constant increase in the construction and use of indoor ranges, some on a commercial basis open to the public, studies were conducted to evaluate exposures to lead and various gases which result from the discharge of firearms. Such studies indicated air-borne lead concentrations far in excess of the maximum allowable concentration of 0.15 milligram per cubic meter of air. It was also found that most indoor ranges had poor mechanical exhaust ventilation, and very few had adequate air conditioning. To reduce the potential health hazard associated with indoor range use, particularly for those full-time employees who serve as range supervisors or clean-up men, the Division has worked in several shooting ranges in various locations to evaluate the problem and make appropriate recommendations. Also, it has prepared a standard drawing and a bulletin on indoor range operation which makes available information on ventilation and noise control design.

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### Degreasing Operation Hazard

During an inspection of a plant manufacturing tin cans it was noted that the cans coming from the soldering operation go through a cold degreaser (1- x 1- x 10 ft.) containing trichlorethylene. It was learned that the company had had a problem with trichlorethylene vapor from the degreaser and had attempted to solve it by putting a layer of water over the trichlorethylene. According to the company, the degreasing is now satisfactory and there is no problem with the rusting of cans. Determinations made with Katagawa detector tubes indicated a maximum concentration of 30 ppm over the degreaser.

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### Use and Handling of Perchloric Acid

"Occupational Health Newsletter," The Environmental Research Laboratory, E314 Health Sciences Building, University of Washington, Seattle, Wash., 12(3): 1 and 2, March 1963.

Perchloric acid is often used in metallurgical, electroplating, analytical, and research laboratories where a strong high-boiling acid with strong oxidizing and good solvent properties are needed.

Wet oxidation of plant and animal matter for subsequent mineral analysis, using nitric and sulfuric acids followed by a small amount of perchloric acid, has been described as requiring very little attention by the operator and no specialized equipment. The perchloric acid is added dropwise near the end of the oxidative process. As outlined by the authors, this biological digestion process appears to be perfectly safe in itself, but many chemists still prefer to ash tissue with a preliminary nitric-sulfuric mixture, and then to finally clarify the digest with superoxol (30%  $\text{H}_2\text{O}_2$ ) applied drop by drop. Unless the laboratory is equipped with appropriate ventilation facilities for the safe handling of perchloric acid, it is recommended that routine use of this strong oxidizer be avoided.

As indicated by incidents described below, fires and explosions are caused by accidental drying of perchloric acid towards the unstable anhydrous state by the addition of a dehydrating agent such as concentrated sulfuric acid or phosphorus pentoxide; by too fast a rate of acid addition; by contamination of organic materials such as from spilling the acid; and by the detonation of an inadvertent formation of organic-oxidizer mixture which clings to and/or combines with the organic lining of duct work, blower, or exhaust hood construction:

A. Several years after a stone table had been patched with a glycerin cement, it exploded when a workman struck it with a chisel.

B. A chemist was injured when an explosion blew sealing grout from around the rear cover plate of an exhaust fan. Perchloric acid fumes appear to have impregnated the sealing media on the fan, and it detonated when the injured prodded the sealing with a screw driver.

C. A maintenance worker was killed and two others injured when an exhaust blower connected to a laboratory hood exploded in a similar manner as described above.

D. A 300-gallon mixture of perchloric acid exploded in Los Angeles in 1947, killing 15 and injuring 400.

E. A seven-pound bottle of perchloric acid solution was dropped on a concrete floor. The liquid was taken up with sawdust and placed in a covered metal waste can. Four hours later a light explosion blew off the cover of the can, causing a fire which opened several sprinkler heads.

F. In an iron foundry laboratory, perchloric acid contamination on the exhaust hood bench detonated when hot lead was spilled on it. The fire flashed with explosive violence into the exhaust hood.



G. A bottle of perchloric acid broke and ran over a fairly large area of a wooden laboratory floor. It was cleaned but some ran down over wooden joists. Several years later, a bottle of sulfuric acid was spilled in the same location and fire broke out immediately in the floor and joists.

H. A chemist dropped a bottle of acid against a steam radiator. Within a few moments, the floor beneath the radiator burst into flames.

Other operational precautions and design criteria are outlined below:

(a) An inert sealant should be used on hood and blower systems in place of glycerin-litharge.

(b) The blower lubricant should be considered hazardous - a fluoro-carbon grease is preferable.

(c) Exhaust systems should be designed with readily demounted vertical ducts, with no manifolds, horizontal runs, or sharp turns.

(d) The hood system and duct work should be equipped to allow for a washdown - at least weekly.

(e) Solutions evaporated to the fuming point might be exhausted through the use of a water aspirator to serve for ventilation and for scrubbing.

(f) Gas flames or oil baths should not be used for heating solutions.

(g) Laboratory setups should use glass-to-glass unions. Rubber tubing or grease should not be used.

(h) Accidental spills should be cleaned up immediately, using large quantities of water.

(i) Glass apparatus should be washed immediately after use. Reagent bottles should be washed with water after each use before returning to shelf.

(j) Partially digested samples and spent solutions should be poured into the drain, using approximately 10 times their volume of water mixed first in a porcelain or glass vessel.

(k) The construction or repair should be by means of silicate of soda and Alundum rather than with such organic material as litharge and glycerin.

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### Hydrofluoric Acid

Submitted by Elizabeth Steffee, Industrial Hygienist, Pearl Harbor Naval Shipyard in Quarterly Occupational Health Report for quarter ending March 1963.

A scientific aide was working in a "semi-conductor physics" laboratory using hydrofluoric acid for cleaning small objects. The work is accomplished in small beakers, using tongs to handle the objects and wearing disposable polyethylene gloves. During the operation he apparently punctured the thumb and forefinger of one glove, and did not immediately notice that his fingers were wet with the HF solution. He did not wash his hands immediately, and as he did not feel pain he did not report for medical aid for several hours. Severe burns on thumb and forefinger have required skin grafting and he will not be able to work for five or six months. All personnel using HF had been given instructions for handling the acid and instructions in first aid procedures.

**RESERVE****SECTION**

Control and Organization of the Naval Reserve  
(concluded)

Consideration shall be given by the National Naval Reserve Policy Board to problems affecting officers and enlisted personnel of the Naval Reserve. Matters may be submitted to the Board by the Secretary of the Navy, offices within the Navy Department, the Commandants of the Naval Districts, the Chief of Naval Air Reserve Training, and Commander, Naval Reserve Training Command. In referring matters to the National Board the District Commandants and the Chief of Naval Air Reserve Training shall include, with their comments and recommended actions, those recommendations of Local Policy Boards which they consider appropriate for National Board consideration. Should an issue develop which requires Board consideration at a time other than during the National Board's annual meeting, such item may be submitted to the President of the Board at that time. Under such circumstances, the matter will be referred to members individually for comment and recommendations.

The Chief of Naval Personnel, with the concurrence of the Chief of Naval Operations, will prescribe the date on which the annual meeting of the Board will be held in the Navy Department and will prescribe its organization and make other necessary arrangements related thereto.

In order to insure that items brought before the National Board represent items of concern to the greatest number of Naval Reservists, Commandants and the Chief of Naval Air Reserve Training shall convene, at least once each year, Local Naval Reserve Policy Boards for the purpose of referring to the National Board, matters of policy which, in the opinion of these Boards, should be given consideration by the National Board.

Each Local Board should be composed of not more than five (5) representative inactive Naval Reservists, officers or enlisted, plus such regular or reserve officers on active duty as the Commandant or CNARESTRA may desire. In order to lend continuity of experience, the members of the National Board and their alternates as practicable, should be members of their respective Local Boards during their tenure and in addition serve as practicable on their respective Local Board the year after the termination of their membership on the National Board. All other members of the Local Boards should be appointed for a two-year tenure, with 50% of the memberships expiring each year.

Any member of the Naval Reserve or Regular Navy may submit Naval Reserve policy items through official channels for consideration. This normally



will be via a District Commandant or CNARESTRA; however, in view of the working relationships of COMNAVRESTRACOMD and CNARESTRA with the operating forces, such items as may originate from these forces shall be channeled via these commands as is appropriate. Problems originating during the year should be referred by the Commandant or CNARESTRA to the senior member and National Board member or members of their Local Board for the purpose of evaluation and determination of possible national significance. If the problem is deemed of sufficient importance, it should then be referred to the entire Local Board for study and comment and the results thereof forwarded via the Commandant or CNARESTRA to the President of the National Board. Problems of less urgent nature should be referred to the Local Board members for study; with a discussion thereof being held at the annual Local Board meeting.

Commandants and CNARESTRA are enjoined to make certain that items referred to the National Board are based upon factual information and are applicable to a broad segment of Naval Reserve. Items considered by Local Boards which are local in nature or amenable to administrative solution should be handled locally or placed in appropriate administrative channels. Items disapproved by Local Boards need not be forwarded to the National Board. Whenever such an item, in the opinion of the Commandant (CNARESTRA), should be considered by the National Board or would provide that Board greater insight into the development of effective Naval Reserve policy, forwarding is encouraged and desirable. (BuPers Manual, Part H)

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### Promotion of Officers

Inactive duty Naval Reserve Medical Corps officers selected for promotion to the grade of Lieutenant Commander by the selection board convened 23 April 1963:

Acker, James J.	Arnas, George C.	Batson, Haliburton C.
Adams, Glenn D.	Austin, William H.	Bazilauskas, V. F.
Adams, Howard D.	Baehr, James M.	Beaulieu, Maurice R.
Adams, Luther T.	Baker, Dudley M.	Beaumier, John H.
Adams, Milton D.	Balay, John Wallace	Bedikian, Armand E.
Adeeb, Allan J.	Ballard, Lester A.	Behnke, John C.
Alexander, Charles M.	Balster, Vernon Henry	Bellamy, George R.
Alleman, Ho	Barber, Emmett R.	Bellezza, Thomas J.
Allen, Joseph J.	Baren, Martin	Belsky, Murray Edwin
Ammons, John Carl, Jr.	Barfield, Frank T., Jr.	Benavides, Claude
Ansell, Burness F., Jr.	Barker, Dell J.	Bennett, Gaylord Way
Antine, Bartley E.	Barner, Hendrick B.	Berg, Leonard
Applegate, William V.	Barnhill Lamuel E.	Berman, Bernard L.
Archambeau, Paul L.	Barrett, David L.	Berman, Stanley L.
Armstrong, James H.	Bates, Hampton R.	Bernadett, Faustino

## Officers selected for promotion to the grade of LCdr (contd.).

Bernstein, Stuart P.	Brown, Harold Z.	Churchill, Don W.
Best, Eric Wilson	Brown, Norman B.	Citron, Neil N.
Bettigole, Richard E.	Brownson, Robert H.	Clark, Aldon E.
Beven, Terence	Bryan, Frank Samuel	Clark, Lawrence M.
Bialas, Henry N.	Buchanan, Richard D.	Clontz, Luther H.
Biron, Pierre E.	Bucy, Donald Louis	Coats, Thomas L.
Bockhacker, Lee E.	Buganski, Raymond R.	Cohen, Irving V.
Boncaldo, Germante L.	Bullington, Walter G.	Cole, Roger B.
Bone, David James	Buxton, George E. P.	Coletti, Larry
Bowers, Norman D.	Cady, Blake	Collins, John Joseph
Boylan, Charles E.	Call, Barbara J.	Collipp, Platon J.
Boyles, Carroll F.	Camarata, Charles A.	Conner, Joel D.
Bransfield, James J.	Cannon, John P.	Connors, Maurice H.
Bregman, Robert U.	Carbonara, Peter N.	Cooper, David R.
Brennan, Martin T.	Carleton, Henry G.	Cooperman, L. R.
Brobyn, Richard D.	Carlsen, Donald A.	Corrigan, Robert F.
Brock, Derek P.	Carter, James P.	Cossman, Francis P.
Brosky, George S.	Celli, Robert R.	Costanza, David J.
Brown, Charles R.	Chandler, James J.	Creswell, Wiltie A.
		(to be continued)

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POSTAGE AND FEES PAID  
NAVY DEPARTMENT

DEPARTMENT OF THE NAVY  
U. S. NAVAL MEDICAL SCHOOL  
NATIONAL NAVAL MEDICAL CENTER  
BETHESDA 14, MARYLAND  
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OFFICIAL BUSINESS  
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Permit No. 1048